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BROWN RUST OF BRANCHED KAKHETINSK WHEAT

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In 1948, at the experimental base of the All-Union Academy of Agricultural Sciences imeni V. I. Lenin at Gorki Leninskiye, a study of the infection of branched wheat by rust and Erysiphe graminis was undertaken. There was also a test of the preparation "colloidal sulfur" and an agent for controlling these diseases; young crops were sprayed with a one-percent solution of colloidal sulfur."

For the investigation of rust and Erysiphe graminis, 50 sample stalks were selected from each of the following: (1) sprayed plots densely sown on 4 May in which clover was grown previously; (2) a plot sown in wide rows on 3 May in which beets had been planted previously; and (3) control plots.

An investigation of the degree of development of rust and Erysiphe graminis was made at three times: at earing -- 8 July; at the end of the flowering period or the beginning of the ripening period -- 23 July; and at the end of the milk stage -- 6 August.

From among all the types of rust infecting wheat, only brown rust developed in 1948. Erysiphe graminis attacked mostly the lower layer of leaves, while on the upper leaves its development was insignificant.

The meteorological conditions of the spring-summer period of 1948 were favorable for the development of brown rust, and in the Lyutestsens 62 and Moskovskaya 48 varieties of spring wheat it was quite strongly developed, reaching 75-80 percent in the upper leaves. Branched wheat was more resistant and in the same period of investigation was infected much less. For example, in the plot sown in wide rows which had been planted in beets previously, and in the control plots, at the end of the milk stage (6 August) brown

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rust on the upper layer of leaves amounted to only 9 percent, on the second layer of leaves to 17 percent; only on the third layer where it reached 40 percent was there any significantly large infection. In the dense sowing of branched wheat following clover, the infection by brown rust was even more weakly expressed. This is due to the fact that the branched wheat usually bushes out in wide row sowing and vegetation is somewhat drawn out, but when sown densely it hardly bushes out at all, ripens more quickly, and consequently is less affected by brown rust.

It should be noted that the great resistance of branched wheat to brown rust is caused by the fact that its type of infection is considerably less severe, (smaller size of the pustules) than that affecting the lyutestsens variety -- the type No 4 infection which has larger pustules and rarely affects branched wheat. On the leaves of branched wheat, single, extremely fine pustules surrounded the dead tissue of the leaves, corresponding to infection type No 1 (local), or the pustules of the rust did not completely perforate outwards, and the mycelia were found to be imbedded in the dead cells, producing the appearance of necrosis (infection type 0 -- nonsusceptibility).

It is also necessary to mention the biological characteristic of branched wheat noted, i.e., the variation in the infection of different plants by brown rust over the whole vegetation period. For instance, in the first investigation period (8 July), there were some very weakly infected plants in which the rust did not increase at all by the third period of investigation (6 August).

Along with the plants resistant to rust there are those in which the rust made marked progress in time, amounting to 40 percent on 23 July in the fourth leaves, as compared to 5 percent at the earlier investigation. It was the same for the upper layers of leaves. The rust had infected 5-15 percent by 23 July as compared with 2-5 percent on 8 July. The leaves of those plants most affected withered prematurely, while the least infected plants still had green leaves at the time of the August investigation.

This example clearly indicates the range of resistance of branched wheat to brown rust, with generally low susceptibility on the whole.

It was noted as well that different plants infected by brown rust in the same weak degree were characterized by great differences in the speed of the natural withering of leaves; this attested to different early ripening qualities of different biotypes in the group of branched wheats. Thus, for instance, on 23 July in the control section which had formerly been planted under beets, the infection of the upper leaves was 5-10 percent while the number of green leaves on the stem varied from 2.5 to 3.9.

Brown rust had developed at the time of earing to a somewhat greater degree on the lower leaves than on the higher. In addition, the infection of the upper leaves was not as great as that of the lower even some weeks after earing.

All this indicates one very important biological feature of branched wheat, i.e., in the process of plant growth there is developed great resistance to brown rust which is shown in the significantly lower infection of its upper level leaves. At the same time, adulterations from the lyutestsens variety of infection are rarely found in branched wheat, and the plots of Moskovskaya 48 and Lyutestsens 62 were very strongly infected in the upper leaves.

In concluding this study of the special features of the infection of Kakhetinsk branched wheat by brown rust, we demonstrated that, in contrast to the majority of types in which the infection of the upper leaves by brown ruse was developed to a high degree, branched wheat suffered the least damage from rust. Consequently, the effect of spraying by a preparation of colloidal sulfur must be less in branched wheat.

A single spraying of branched wheat with a one-percent concentration does not give positive results. Double spraying of branched wheat by colloidal sulfur in the same concentration results in an insignificant reduction of infection by rust (an average of 15 percent as compared to 20 percent in the control, for the three upper layers of leaves). Because of this and other considerations, it is not possible to recommend for the control of brown rust of wheat a reduction in the concentration of the colloidal sulfur suspension to one percent from the 2 percent established by the results of work done in the past at the Scientific Research Institute of Fertilizers and Insectofungicides.

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